UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO EXEMPTION FROM

SECTION III.O OF APPENDIX R TO 10 CFR PART 50

FACILITY OPERATING LICENSE NO. NPF-6

ENTERGY OPERATIONS, INC.

ARKANSAS NUCLEAR ONE, UNIT NO. 2

DOCKET NO. 50-368

1.0 INTRODUCTION

Appendix R, "Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979," to Title 10 of the Code of Federal Regulations (10 CFR) Part 50, establishes fire protection features required to satisfy General Design Criterion 3, "Fire protection," of Appendix A to 10 CFR Part 50 with respect to certain generic issues for nuclear power plants licensed to operate prior to January 1, 1979. By letter dated December 23, 1996, Entergy Operations Inc., the licensee for Arkansas Nuclear One, Unit 2 (ANO-2), requested an exemption from certain technical requirements of Appendix R.

2.0 EXEMPTION REQUESTED

The licensee requested an exemption from the technical requirements of Section III.O of Appendix R to 10 CFR Part 50 to the extent that it requires that the reactor coolant pump (RCP) lube oil fill lines be protected with a collection system.

3.0 DISCUSSION

The purpose behind the reactor lube oil collection system is to prevent a major lube oil fire from occurring inside of the reactor containment as a result of a lube oil leak from the RCPs.

Periodically, as a result of oil consumption during power operations, the licensee needs to add oil to the RCP motor lube oil reservoirs. Prior to 1991, the licensee accomplished oil addition by going into the containment building cavities (inside the D-rings) and adding the oil using the fill connection on the motor. This resulted in both ALARA (750-1000 mR per entry) and personnel safety concerns (e.g., heat stress and climbing ladders while carrying containers of oil).

In 1991, the licensee installed a temporary modification to resolve the ALARA and safety concerns. This modification installed a funnel outside of the D-ring and routed a hose to the oil fill connection of the motor upper reservoir. Oil addition efforts following the installation of the temporary modification resulted in reduced radiation dose (reduced to 50-75 mR per entry).

Later, in April 1994, the licensee installed a permanent remote oil addition system. This modification installed a gravity feed oil fill system to both RCP motors in each D-ring. The system consists of a ten gallon capacity funnel with spill protection, a lubrication oil addition valve manifold and isolation ball valves (with an oil collection pan underneath), 3/4 inch diameter stainless steel tubing with a stainless steel flexible connection to each coolant pump motor reservoir fill connection. All lines are seismically mounted. Neither the stainless steel tubing nor the flexible hose are protected by a an oil collection system. The connections to the motors are protected by installed oil collection system pans. The maximum level in the reservoirs is lower than the oil addition connections. The minimum slope of the installed tubing is 1/4 inch per 12 inches of tubing run. This ensures that the system drains following each use and remains a dry system. This tubing is not pressurized. Oil is present in the tubing only during fill evolutions. By procedure, the licensee limits the initial oil addition to two gallons, until verification that the oil reservoir on the appropriate pump motor has shown a corresponding increase. This limits the amount of oil which could leak and cause a fire to two gallons.

The oil addition tubing is also routed such that no leakage from the system could reach any fibrous insulation located in the containment building. Should the system leak from the fittings around the valve manifold, the leakage would be collected by the drip tray located under the manifold. Personnel involved in the filling evolution would then remove the oil before it could become a fire hazard.

Any oil leakage outside of the reactor cavities would migrate to the containment sump and present no fire hazard to safe shutdown equipment. Any oil leakage inside of a reactor cavity would flow to the equipment drains under the reactor coolant pumps. The temperature in the area is expected to remain below the autoignition temperature of the lube oil.

A pre-action sprinkler system and an ionization-type smoke detection system with control room alarms protect the cable trays in the containment building cable spreading areas. In addition, two ionization-type smoke detectors are installed in the area of the reactor coolant pumps inside of each cavity. The detection system provides early warning of possible fire conditions and the suppression system is designed to control the spread of fire, if one were to occur.

In order to minimize the potential for an oil fire due to a leak from the lines of the remote addition system that do not have an oil collection system, the licensee will take the following compensatory actions each time oil is added.

- Limit initial oil addition to two gallons.
- Verify that the two gallons of oil has reached the reservoir of the correct reactor coolant pump motor (i.e., verify that the oil has not leaked from the oil fill line).

- Add the remaining oil only after confirmation that the initial two gallons has reached the appropriate oil reservoir.
- Limit the total oil added to less than the amount calculated to result in an indicated reservoir level of 95 percent.
- Verify the oil addition funnel is empty prior to closing the lube oil manifold ball valve after oil has been added.
- Remove any oil in the drip pan under the lube oil manifold prior to exiting the containment building.
- Inspect for evidence of smoke following the oil addition. If smoke is detected, a fire brigade will be dispatched to the area.

If at any point during oil addition the licensee determines that the oil is not reaching the desired location, it will terminate the activity and initiate a condition report to assess the situation.

10 CFR 50.48 requires nuclear power plants licensed prior to January 1, 1979, to implement 10 CFR Part 50, Appendix R, Section III.O. Section III.O requires that the licensee have a collection system "capable of collecting lube oil from all pressurized and unpressurized leakage sites in the reactor coolant pump lube oil systems." It also specifies that "leakage points to be protected shall include lift pump and piping, overflow lines, lube oil cooler, oil fill and drain lines and plugs, flanged connections on oil lines, and lube oil reservoirs where such features exist on the reactor coolant pumps." The underlying purpose of the rule is to ensure that leaking oil will not lead to a fire which could damage safe shutdown systems during normal or design basis accident conditions.

4.0 EVALUATION

The staff was concerned that damage to the stainless steel tubing could result in a lube oil leak into the containment during the addition of lube oil, that the leaked lube oil would ignite, and that the resulting fire could affect the ability to achieve and maintain post-fire safe shutdown conditions.

Due to compensatory actions taken by the licensee during oil addition, the maximum potential oil leak is two gallons. The maximum oil leak is limited to two gallons primarily because the fill operation will be performed in batches. No more than two gallson of oil will be in the oil fill lines at any one time. The ANO-2 fire hazards analysis for the containment building considers the entire building as a single fire area. The containment building is divided into two fire zones. The zones were divided on the basis of clear space without intervening combustibles and provision of fire stops where cables provide a pathway between zones.

Due to separation of redundant components, a leak from the oil addition lines for the "C" and "D" reactor coolant pumps pose no significant threat to the safe shutdown capability. The fire zone containing the "A" and "B" reactor coolant pumps contains redundant channels of instrumentation for safe shutdown. Outside of the reactor cavities, oil from a leak would migrate to the containment floor and then to the containment sump. In the event a fire were to occur, it would be limited to two gallons of oil. The oil would have to spread twenty feet to reach the nearest safe shutdown component (pressurizer pressure wide range pressure transmitter). Due to the lack of oil addition system pressurization, the size of the containment (10,500 sq. ft.), the limited fire size caused by two gallons of lube oil, and no direct line of sight between the transmitters and postulated fire location, there is reasonable assurance that damage would not occur to safe shutdown equipment.

Fire detection and manual fire suppression equipment is available in the vicinity of the lube oil fill lines. In the event of a fire, it is expected that the detector will alarm and the fire brigade will respond to extinguish the fire in its incipient stages. This provides further assurance that a worst-case postulated fire would not damage safe shutdown equipment.

5.0 CONCLUSION

Therefore, contingent on the use of the compensatory measures that are itemized in the licensee's exemption request dated December 23, 1996, the staff concluded that the design of the oil filling system and the level of protection provided during oil fill operations provide reasonable assurance that a lube oil fire will not occur. The staff also concluded that in the event of a worst-case postulated fire, due to not having a lube oil collection system for the reactor coolant pump lube oil fill lines, it would be of limited magnitude and extent. In addition, such a fire would not cause significant damage in the containment building and would not prevent the operators from achieving and maintaining safe shutdown conditions. The staff concluded, therefore, that special circumstances are present in that an oil collection system for the reactor coolant pump lube oil fill lines is not necessary to achieve the underlying purpose of the rule, and that an exemption as described herein is authorized by law, will not present or undue risk to public health and safety, and is consistent with the common defense and security. The licensee's request for exemption should. therefore, be granted.

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